

November 10, 2015

**Ms. Ashley MacPherson**

Procurement and Administration Manager  
Canadian Museum of Immigration at Pier 21  
201-1099 Marginal Road  
Halifax, NS  
B3H 4P7

**Subject: Limited Hazardous Materials Assessment – Canadian Museum of Immigration (CMIP)  
at Pier 21, Marginal Road, Halifax, NS**  
Our ref.: 21107

Ms. MacPherson

At your request, Englobe Corp. (Englobe) has conducted a limited hazardous material assessment within a select renovation location at the above-noted site. The purpose of the survey was to summarize information on potential substances that could have an adverse effect on the environment (i.e. disposal) or individuals during the removal of the existing escalators and installation of stairs. The area assessed was limited to 50 ft<sup>2</sup> where the future stairs will be attached to the current support structure, as directed on site.

The survey focused on asbestos, lead-based paint, lead dust and microbial contamination.

Englobe personnel conducted the survey on October 30, 2015.

## **1. ASBESTOS**

The survey included the sampling of any material suspected to contain asbestos.

The term friable means that the building material can be reduced to dust by hand or moderate pressure. Friable asbestos-containing materials pose a greater risk to workers and building users for releasing airborne asbestos fibres when disturbed.

During the survey, the building was inspected to identify materials that could have been reasonably expected to contain asbestos. Samples of these materials, which were limited to drywall joint compound, were collected. Two (2) samples were collected from the renovation area for asbestos analysis.

...2

All samples were analysed by stereomicroscopy at about 10-20X magnification to determine the types and relative amounts of the different fibres present. Representative fibres were then selected and examined using polarised light microscopy and dispersion staining techniques at 40-100X magnification to determine the asbestos species present. All laboratory work was conducted in-house by Englobe personnel.

### 1.1 Summary of Asbestos-Containing Materials

**No asbestos-containing materials were identified during the limited survey of the subject renovation area.**

Sample results are summarized in Table 1, below and on the following page. It should be noted that the table below is meant to be a list of samples with corresponding sample locations and results for the purpose of providing clarity on the materials sampled. It is not intended to be a description of the locations of all asbestos-containing materials at the site.

Table 1: Asbestos Bulk Sample Results

SAMPLE NO.	SAMPLE LOCATION & DESCRIPTION	ASBESTOS CONTENT
A1	Drywall joint compound, white	None detected
A2	Drywall joint compound, white	None detected

## 2. LEAD IN PAINT

In order to assess the concentrations of lead in painted materials at the subject renovation area of the site, Englobe personnel collected samples of painted building materials that represent various coloured surfaces and various substrates from the subject renovation area of the building. Paint samples were collected with substrate where paint was well-adhered, where practical.

Two (2) samples were collected and submitted to Maxxam Analytics in Bedford, NS for analysis of total and leachable lead content. The purpose of this sampling is to determine the disposal requirements for painted materials at the subject property.

Results are compared to the *Nova Scotia Environment and Labour Guidelines for the Disposal of Contaminated Solids in Landfills* (March 22, 1994).

The lead paint results are provided in Table 2, on the following page. A copy of the laboratory certificate of analysis is attached. It should be noted that the table below is meant to be a list of samples with corresponding sample locations and results for the purpose of providing clarity on the materials sampled. It is not intended to be a description of the locations of all lead-based painted materials at the site.

Table 2: Total and Leachable Lead in Paint Results

SAMPLE NO.	SAMPLE LOCATION & DESCRIPTION	TOTAL LEAD (mg/kg)	LEACHABLE LEAD (mg/L)
P1	Light grey paint on drywall	68	-
P2	Dark grey paint chips on original structural 'I' beams	8,400	0.56
Nova Scotia Disposal Criteria <sup>1</sup>		1,000	5

<sup>1</sup> Nova Scotia Environment and Labour *Guidelines for Disposal of Contaminated Solids in Landfill* (March 22, 1994).

## 2.1 Handling of Lead-Based Paints

Any disturbance or removal of lead-based painted materials that may generate metals dust or respirable aerosols will need to conform to the federal and provincial *Occupational Health and Safety Act Regulations*.

All work should be carried out by individuals qualified to handle lead-containing materials and will require, as a minimum, workers to wear proper personal protection equipment.

Some of the Codes of Practice, Guidelines and Regulations pertaining to lead are given below:

- *Code of Practice for Working With Inorganic Lead*, June 2010
- *Working with Lead - An Information Package*, August 2001

As lead was detected in all of the samples, worker protection and precautions are required during renovation activities to prevent generation of lead-laden dusts that could cause worker and neighbour exposure and property contamination.

## 2.2 Disposal of Lead-Based Paints

Disposal of lead-containing construction debris is regulated provincially by NSE. The landfill disposal limit for total lead in metals-based paint is 1,000 mg/kg. If total lead levels exceed 1,000 mg/kg a leachate test is conducted. If the leachate concentration of lead is 5 mg/L or greater, then the waste material is considered a hazardous waste and will not be approved for disposal in a waste disposal site in Nova Scotia.

Based on the total lead results, one (1) sample of painted building materials (labelled as "P2") was found to exceed the NSE disposal criteria and NSLAE guideline for total lead content. Therefore, the sample was resubmitted for leachable lead analysis. Leachable lead results satisfy the NSE disposal criteria. Based on these results, all painted materials sampled can be disposed of at an approved waste disposal site and are not required to be manifested as dangerous goods during transport.

### 3. LEAD DUST

Lead dust samples were collected from various locations in the subject renovation area of the building. Dust samples were found to contain between 62.5 µg/100 cm<sup>2</sup> and 1,950 µg/100 cm<sup>2</sup> lead. Lead was detected in all samples collected.

Sample locations and results are described below. The table provides sample locations and results. It is not intended to be a comprehensive list of where all lead contamination is present.

The laboratory certificate of analysis for the lead dust samples is attached.

Table 3: Total Lead in Lead Swabs

SAMPLE NO.	SAMPLE LOCATION AND DESCRIPTION	LAB RESULT (µg/100cm <sup>2</sup> )
PB1	Structural original 'I' Beam	1,950
PB2	Newer ventilation ducting	80.9
PB3	Electrical conduit	62.5
<b>Health Canada Guideline</b>		<b>43</b>

**Black** boxed text: concentration exceeds Health Canada guideline

Since Canada does not have specific guidelines for settled lead dust on surfaces in institutional/commercial buildings, results were compared to the least conservative number set out in the US EPA guidelines, as referenced in the *Health Canada Lead in Paint and Dust Guidelines* of 43 µg/100cm<sup>2</sup>.

Although various samples from the building were collected from beams, ducting, and conduit, and not areas with designated criteria in the Health Canada guidelines, lead dust may contaminate areas with set criteria during the upcoming planned renovation work.

Based on the test results, all three (3) samples collected and submitted for analysis had lead dust concentrations that exceeded this value, and therefore pose a potential exposure concern to building occupants (including workers) in the subject area during the upcoming renovation work. The elevated concentrations of lead in the settled dust also indicate that aerosolization of lead dust may occur during renovation activities. The threshold limit value (TLV) for occupational health exposure for lead is set as a time weighted average (TWA) of 0.05 mg/m<sup>3</sup> by ACGIH (The American Conference of Governmental Industrial Hygienists).

It is recommended that prior to renovation work, all settled dust be removed with a HEPA vacuum and wet wiping and employees wear the appropriate respiratory protection and disposable clothing during the dust removal work.

The removal of lead dust should be conducted whether or not the renovation work occurs to avoid potential future contamination of surfaces in the building.

#### **4. MICROBIAL CONTAMINATION**

No evidence of microbial growth was noted during the assessment.

#### **5. SURVEY LIMITATIONS**

This report was prepared for the exclusive use of Canadian Museum of Immigration at Pier 21, and is based on data and information obtained during site visit by Englobe and is based solely upon the condition of the subject area of the property on the date of the site visit, supplemented by information obtained and described herein. Only the above described building location was included in the scope of the work.

The evaluation and conclusions contained in this report have been prepared based on the expertise and experience of Englobe. In evaluating the site, Englobe has relied in good faith upon representation and information furnished by individuals noted in the report with respect to existing site conditions to the extent that they have not been contradicted by data obtained by other sources. Accordingly, Englobe accepts no responsibility for any deficiency or inaccuracy in this report as a result of omissions, misstatements or misrepresentations of the person(s) interviewed. In addition, Englobe will not accept liability for loss, injury, claim or damage arising from any use or reliance on this report as a result of misrepresentation or fraudulent information.

The limited hazardous building materials survey addresses the specified hazardous building materials only. Attempt was made to identify materials in the subject area of the building with potential to contain hazardous substances. It is possible, however, that hazardous or regulated materials other than those mentioned in this report may be present. The survey did not include investigations for contaminated soils/groundwater.

The statements and conclusions presented in this report are professional opinions based upon data and information obtained during a survey by Englobe, visual observations made during the survey, and on interpretation of asbestos, lead paint and lead dust laboratory analyses. The opinions in this report are given using generally accepted scientific judgment, principles, and practices; however, because of the inherent uncertainty in this process no guarantee of conclusion is intended or can be given.

Subject : Limited Hazardous Materials Assessment  
CMIP Pier 21, Halifax NS  
Project No.: 21107

November 10, 2015

## 6. CLOSING

We trust this is to your satisfaction. If, however, additional information should be required, please communicate with the undersigned.

Yours Truly,  
**Englobe Corp.**

A handwritten signature in blue ink that reads "E. Rogers". The signature is written in a cursive style with a large initial "E".

Elizabeth Rogers, B.Tech(Env), CET  
Project Manager, Environmental Engineering

Attachments

Your Project #: 21107  
 Site Location: HFX  
 Your C.O.C. #: D004225

**Attention:Elizabeth Rogers-Patterson**

Englobe Corp.  
 97 Troop Ave  
 Dartmouth, NS  
 CANADA B3B 2A7

**Report Date: 2015/11/09**  
 Report #: R3756336  
 Version: 2 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B5M2405**  
**Received: 2015/10/30, 13:55**

Sample Matrix: Paint  
 # Samples Received: 2

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
CGSB extraction - Init and Final pH	1	N/A	2015/11/06	ATL SOP 00034	CGSB 164-GP-1 MP m
CGSB extraction - volume of extractant	1	N/A	2015/11/06	ATL SOP 00034	CGSB 164-GP-1 MP m
CGSB extraction - Dry Weight	1	N/A	2015/11/06	ATL SOP 00034	CGSB 164-GP-1 MP m
Metals Leach TCLP/CGSB extraction	1	2015/11/06	2015/11/07	ATL SOP 00058	EPA 6020A R1 m
Metals Paint Acid Extr. ICPMS	1	2015/11/03	2015/11/03	ATL SOP 00058	EPA 6020A R1 m
Metals Bulk Acid Extr. ICPMS	1	2015/11/03	2015/11/03	ATL SOP 00058	EPA 6020A R1 m
Moisture	1	N/A	2015/11/05	ATL SOP 00001	OMOE Handbook 1983 m

Sample Matrix: Swab  
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
Acid Extractable Metals in Swabs	3	2015/11/02	2015/11/02	ATL SOP 00058	EPA 6020A R1 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.  
 Avery Withrow, Project Manager  
 Email: AWithrow@maxxam.ca  
 Phone# (902)420-0203 Ext:233

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**CGSB LEACHATE + LEAD (PAINT)**

<b>Maxxam ID</b>		BGK731			
<b>Sampling Date</b>		2015/10/30			
<b>COC Number</b>		D004225			
	<b>UNITS</b>	<b>P2</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MDL</b>
<b>Charge/Prep Analysis</b>					
Dry Weight	g	3.3	0.010	4261365	N/A
Volume of Acetic Acid	mL/L	15	N/A	4261367	N/A
<b>Inorganics</b>					
Moisture	%	<5.0 (1)	5.0	4258025	0.20
Initial pH	N/A	6.2	N/A	4261366	N/A
Final pH	N/A	5.5	N/A	4261366	N/A
<b>Metals</b>					
Leachable Lead (Pb)	ug/L	560	5.0	4261593	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Moisture value reported is a visual estimate for calculation purposes.					



**ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)**

<b>Maxxam ID</b>		BGK730		BGK731			
<b>Sampling Date</b>		2015/10/30		2015/10/30			
<b>COC Number</b>		D004225		D004225			
	<b>UNITS</b>	<b>P1</b>	<b>QC Batch</b>	<b>P2</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MDL</b>
<b>Metals</b>							
Acid Extractable Lead (Pb)	mg/kg	68	4255829	8400	5.0	4255828	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							

**ELEMENTS BY ICP/MS (SWAB)**

Maxxam ID		BGK732	BGK733	BGK734			
Sampling Date		2015/10/30	2015/10/30	2015/10/30			
COC Number		D004225	D004225	D004225			
	UNITS	PB1	PB2	PB3	RDL	QC Batch	MDL
<b>Metals</b>							
Lead (Pb)	ug	1950	80.9	62.5	0.125	4254593	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							

**TEST SUMMARY**

**Maxxam ID:** BGK730  
**Sample ID:** P1  
**Matrix:** Paint

**Collected:** 2015/10/30  
**Shipped:**  
**Received:** 2015/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Bulk Acid Extr. ICPMS	FICP/MS	4255829	2015/11/03	2015/11/03	Bryon Angevine

**Maxxam ID:** BGK731  
**Sample ID:** P2  
**Matrix:** Paint

**Collected:** 2015/10/30  
**Shipped:**  
**Received:** 2015/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
CGSB extraction - Init and Final pH		4261366	N/A	2015/11/06	Lee Buott
CGSB extraction - volume of extractant		4261367	N/A	2015/11/06	Lee Buott
CGSB extraction - Dry Weight		4261365	N/A	2015/11/06	Lee Buott
Metals Leach TCLP/CGSB extraction	CICP	4261593	2015/11/06	2015/11/07	Bryon Angevine
Metals Paint Acid Extr. ICPMS	FICP/MS	4255828	2015/11/03	2015/11/03	Bryon Angevine
Moisture	BAL	4258025	N/A	2015/11/05	Julia McGovern

**Maxxam ID:** BGK732  
**Sample ID:** PB1  
**Matrix:** Swab

**Collected:** 2015/10/30  
**Shipped:**  
**Received:** 2015/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals in Swabs	FICP/MS	4254593	2015/11/02	2015/11/02	Bryon Angevine

**Maxxam ID:** BGK733  
**Sample ID:** PB2  
**Matrix:** Swab

**Collected:** 2015/10/30  
**Shipped:**  
**Received:** 2015/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals in Swabs	FICP/MS	4254593	2015/11/02	2015/11/02	Bryon Angevine

**Maxxam ID:** BGK734  
**Sample ID:** PB3  
**Matrix:** Swab

**Collected:** 2015/10/30  
**Shipped:**  
**Received:** 2015/10/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals in Swabs	FICP/MS	4254593	2015/11/02	2015/11/02	Bryon Angevine

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	17.7°C
-----------	--------

Revised report: Additional lead leachate on P2 as requested by Elizabeth Rogers. 2015/11/03

**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4254593	BAN	QC Standard	Lead (Pb)	2015/11/02		104	%	75 - 125
4254593	BAN	Spiked Blank	Lead (Pb)	2015/11/02		99	%	75 - 125
4254593	BAN	Method Blank	Lead (Pb)	2015/11/02	<0.125		ug	
4255828	BAN	Matrix Spike	Acid Extractable Lead (Pb)	2015/11/03		NC	%	75 - 125
4255828	BAN	Spiked Blank	Acid Extractable Lead (Pb)	2015/11/03		98	%	75 - 125
4255828	BAN	Method Blank	Acid Extractable Lead (Pb)	2015/11/03	<5.0		mg/kg	
4255828	BAN	RPD - Sample/Sample Dup	Acid Extractable Lead (Pb)	2015/11/03	4.1		%	35
4255829	BAN	Matrix Spike	Acid Extractable Lead (Pb)	2015/11/03		97	%	75 - 125
4255829	BAN	Spiked Blank	Acid Extractable Lead (Pb)	2015/11/03		98	%	75 - 125
4255829	BAN	Method Blank	Acid Extractable Lead (Pb)	2015/11/03	<5.0		mg/kg	
4255829	BAN	RPD - Sample/Sample Dup	Acid Extractable Lead (Pb)	2015/11/03	NC		%	35
4261365	LBU	Method Blank	Dry Weight	2015/11/06	NA, RDL=0.010		g	
4261365	LBU	RPD - Sample/Sample Dup	Dry Weight	2015/11/06	0		%	25
4261366	LBU	Method Blank	Initial pH	2015/11/06	6.1		N/A	
			Final pH	2015/11/06	5.1		N/A	
4261366	LBU	RPD - Sample/Sample Dup	Initial pH	2015/11/06	0.13		%	25
			Final pH	2015/11/06	0.15		%	25
4261367	LBU	Method Blank	Volume of Acetic Acid	2015/11/06	0.0		mL/L	
4261367	LBU	RPD - Sample/Sample Dup	Volume of Acetic Acid	2015/11/06	0		%	25
4261593	BAN	Matrix Spike	Leachable Lead (Pb)	2015/11/07		103	%	75 - 125
4261593	BAN	Spiked Blank	Leachable Lead (Pb)	2015/11/07		102	%	80 - 120
4261593	BAN	Method Blank	Leachable Lead (Pb)	2015/11/07	<5.0		ug/L	
4261593	BAN	RPD - Sample/Sample Dup	Leachable Lead (Pb)	2015/11/07	NC		%	35

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

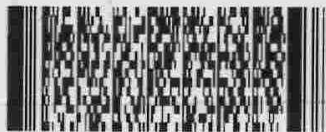
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

This column for lab use only:				INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):										TURNAROUND TIME																		
Client Code		41009		Company Name: <b>Englobe</b>		Company Name:		Project # / Phase#		21107		Standard <input type="checkbox"/>		If RUSH, Specify Date:		3 DAY																		
Maxxam Job#		B5M2405		Contact Name: <b>Elizabeth Rogers</b>		Contact Name:		Project Name		HFX		Quote		-		Pre-schedule rush work																		
Cooler ID		Temp 1	Temp 2	Temp 3	Address: <b>97 Troop Ave</b>		Address: <b>SAME</b>		Site #		-		Site Location		HFX		Charge for # Jars used but not submitted																	
					Postal Code: <b>Dartmouth</b>		Postal Code:		Sampled by		AT																							
					Email: <b>Elizabeth.Rogus@englobecorp.com</b>		Email:																											
					Ph: <b>902-468-6486</b> Fax:		Ph:																											
					Guideline Requirements/ Detection Limits/ Special Instructions																													
					* Lead Dust 10cm x 10cm																													
					* Crush paint & substrate																													
Integrity YES NO		Integrity Checklist by:		* Specify Matrix; Surface/Salt/Ground/Tapwater/Sewage/Effluent/Potable/NonPotable/Tissue/Soil/Sludge/Metal/Seawater		Field Filtered & Preserved	Field Preserved	Lab Filtration Required	Choose Total or Diss Metals RCAP-30	Choose Total or Diss Metals RCAP-MS	Total Digest (Default Method) for well water & surface water	Dissolved for ground water	Mercury	Metals & Mercury (Default Acid Extractable (Available) Digest)	Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Mercury Low level by Cold Vapour AA	Hot Water soluble Boron (required for CCME Agricultural)	RBCA Hydrocarbons (BTEX, C6-C9)	Hydrocarbon Soil (Petroleum, NS Fuel Oil Spill Policy Low Level) BTEX, C6-C9	NS Potable Water BTEX, VPH, Low level T.E.H	RBCA Fractionation	PAHS	FWAL PAHS in water (with Acridine, Quinoline)	PCBS	VOCs	Lead Dust	Total Lead							
Field Sample Identification				Matrix *	Date/Time Sampled	# of bottles																												
1	P1	Printer sub	Oct 30/15	1xbag																													X	
2	P2	Print. Chgs		1xbag																													X	
3	Pb1	Dust wipe		1x50ml																													X	
4	Pb2																																X	
5	Pb3																																X	
6																																		
7																																		
8																																		
9																																		
10																																		
RELINQUISHED BY: (Signature/Print)				Date				Time				RECEIVED BY: (Signature/Print)				Date				Time														
				Oct 30/2015												15 OCT 30 10:55																		
Alain Theriault												Matt Farrell																						



B5M2405